



Wt Analysis: b-tagging

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Outline

- Last presentation (Sep 2005)
 - first look to b-taggers
 - performance
 - efficiency/rejection
 - no MC truth info available
- Today
 - second pass with MC truth info
- Next: need appropriate backgrounds



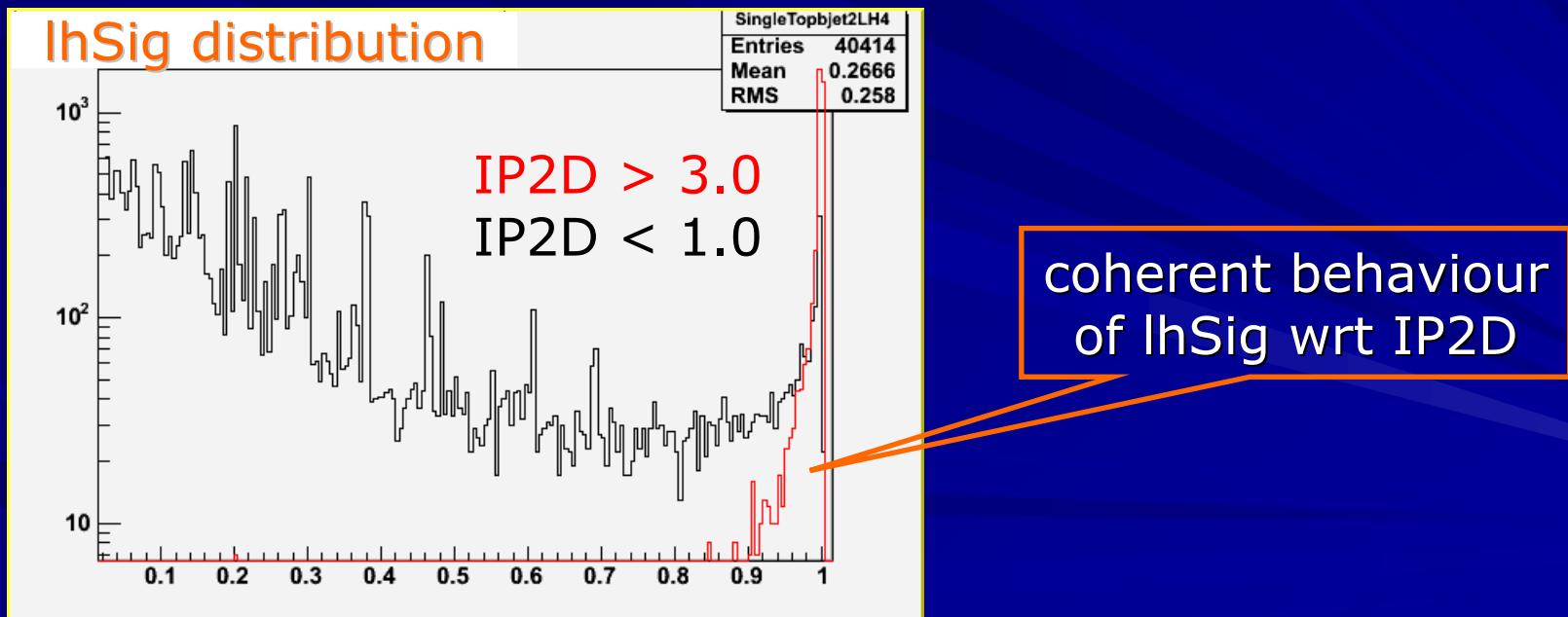
b-taggers

- Considered in this study
 - IP2D, IP3D: transverse/3D impact parameter
 - SV1: lifetime tagger (secondary vertex)
 - lhSig: lifetime and impact parameter
- b-tagging method process dependent
 - applied on Wt signal
 - rome.004530.recov10.wt_ph_ml
 - rome.004530.recov10.wt_pl_mh
 - reconstructed jets
 - ConeTowerParticleJets
 - BJetCollection (b-tagging run for 0.7 cone jets only)



A Look Back to September

- No MC truth information available
 - identify b-jets by means of one tagger
 - use these b-jets to test a second tagger





A Step Forward

- Use MC truth information to identify jets
 - $|\text{jetTruthLabel}|=5$
 - essentially from ΔR jet-parton matching
- Define b-jet efficiency (ε_b)
 - denominator:
 - b-jets with (raw) $p_T > 15 \text{ GeV}/c$, $|\eta| < 2.5$
 - jets with no “good” tracks for b-tagging are included
 - numerator:
 - *ditto* + cut on tagging variable
- Define Light-jet rejection ($R_u = 1/\varepsilon_u$)
 - $R_u = 100$ meaning 1% mistag rate



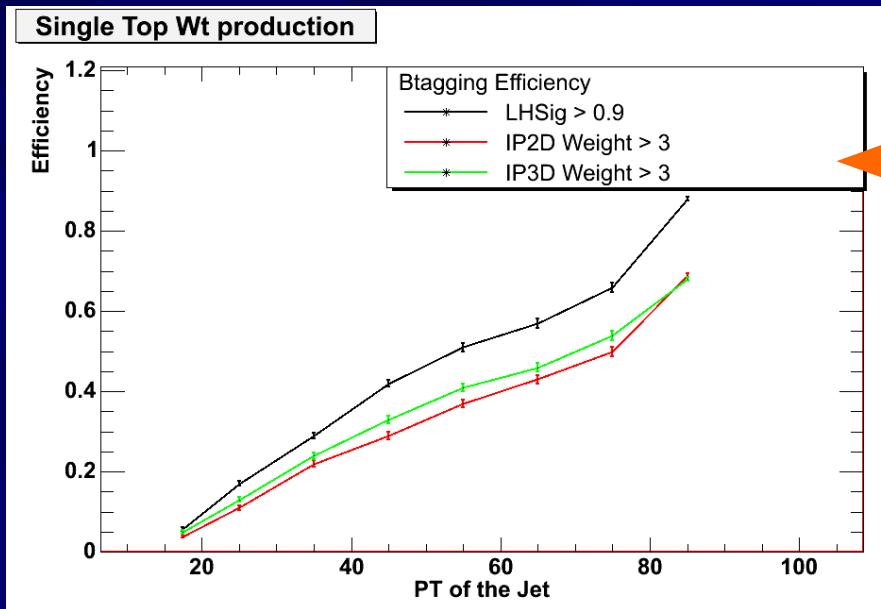
b-tag Efficiencies: Results

- b-tag efficiency as a function of tagging variable

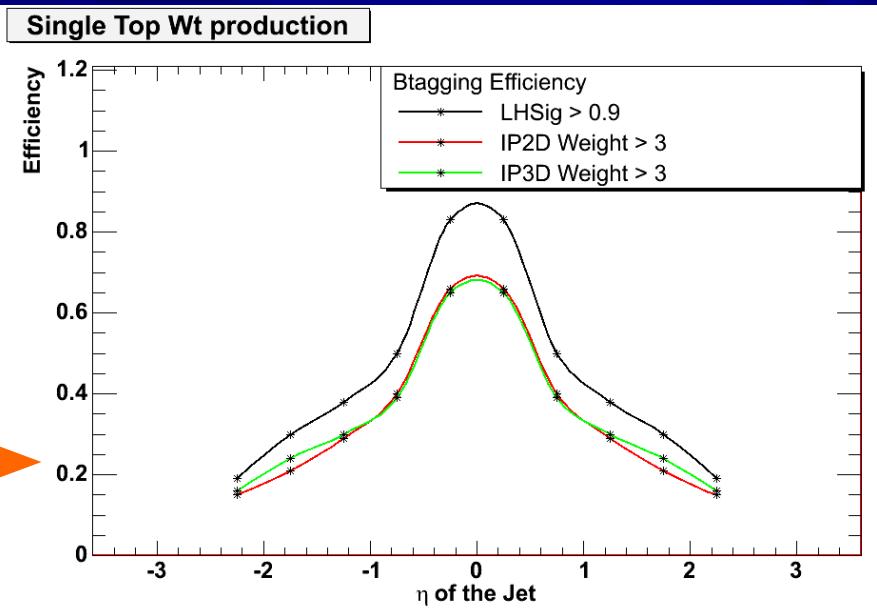
IP2D/IP 3D Cut	ε_b IP2D	ε_b IP3D	SV1 Cut	ε_b SV1	IhSig Cut	ε_b IhSig
1	0.60	0.61	1	0.63	0.1	0.80
2	0.54	0.56	2	0.59	0.2	0.76
3	0.49	0.50	3	0.45	0.3	0.72
4	0.43	0.45	4	0.53	0.4	0.70
5	0.38	0.41	5	0.51	0.5	0.68
6	0.33	0.37	6	0.48	0.6	0.67
7	0.29	0.32	7	0.46	0.7	0.65
8	0.25	0.26	8	0.43	0.8	0.63
9	0.21	0.25	9	0.41	0.9	0.60



b-tag Efficiencies: Results



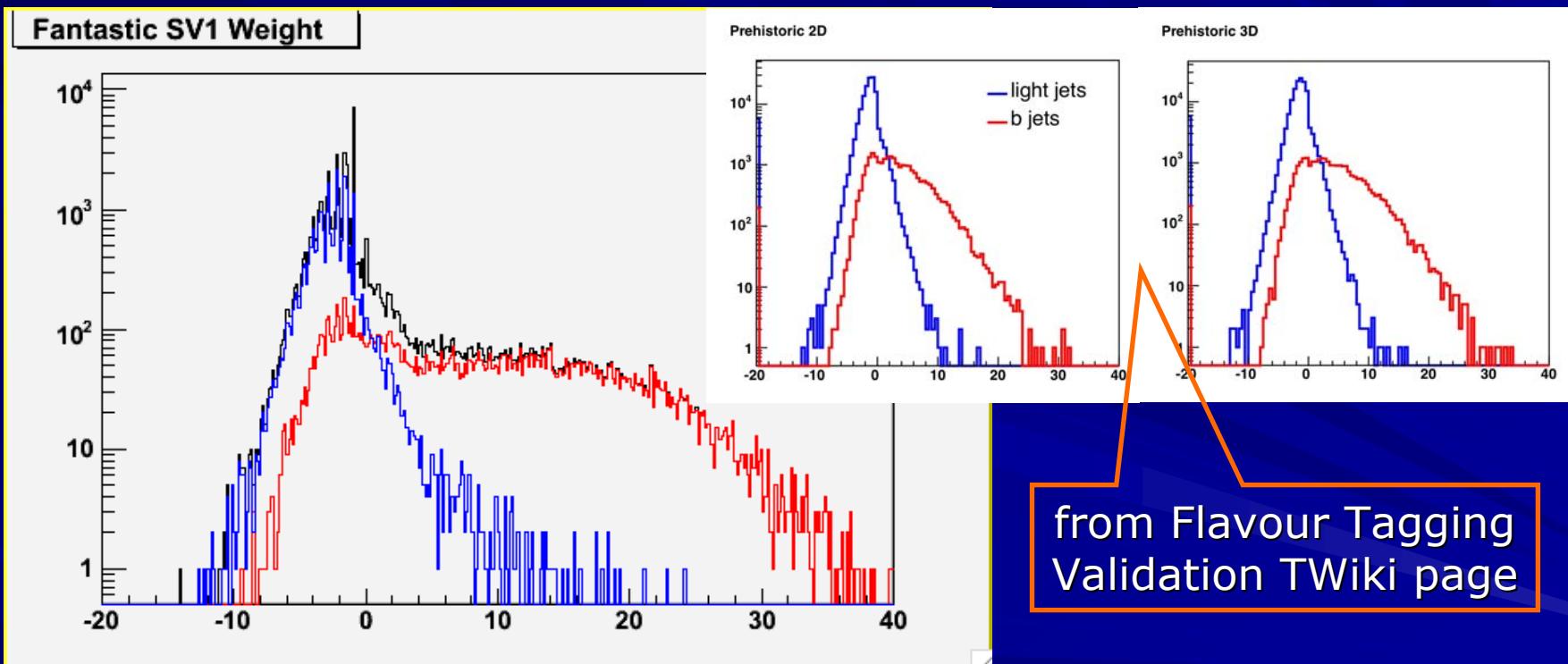
b-tag efficiency wrt jet p_T



b-tag efficiency wrt jet η

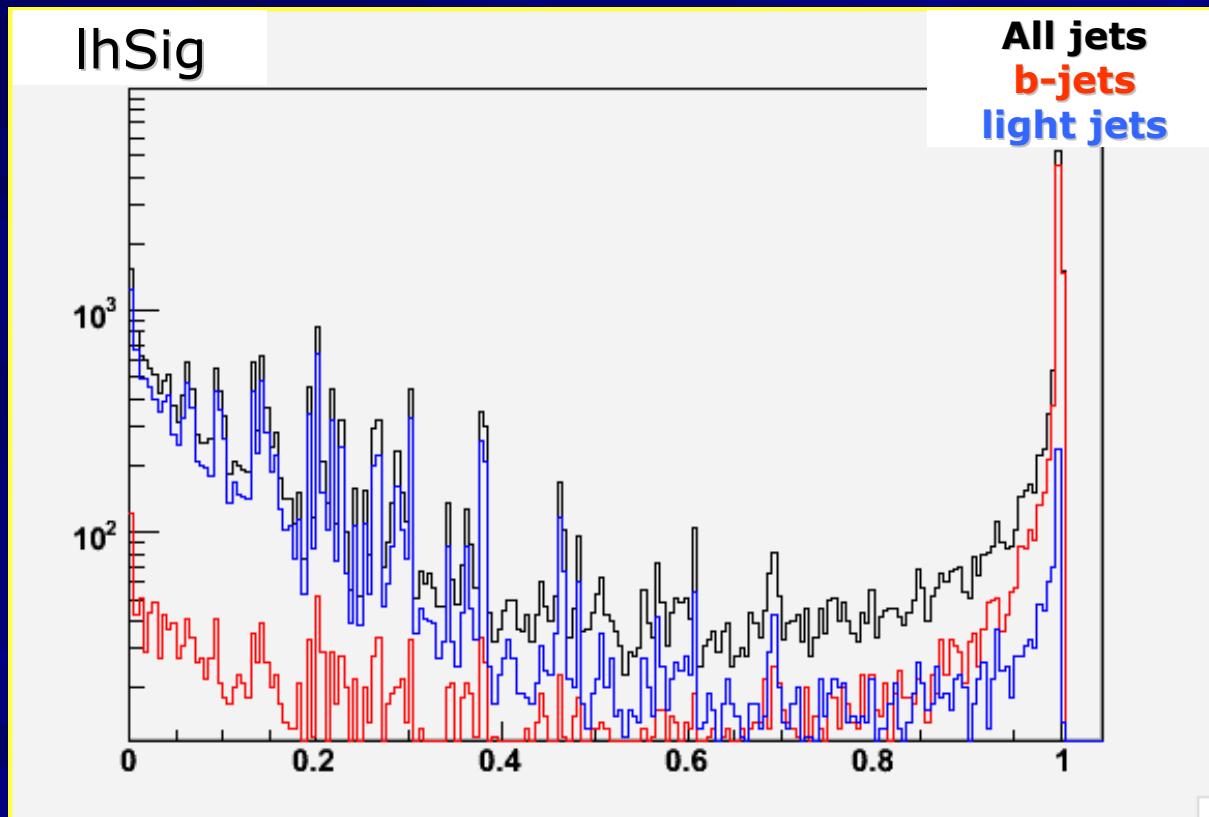


Tagging Variables (Weights)





Tagging Variables (lhSig)





Light-Jet Rejection

	$R_u(\varepsilon_b=50\%)$	$R_u(\varepsilon_b=60\%)$
IhSig		33 (55-57)
SV1	100 (228-130)	33 (86-66)
Wt sample		
WH sample		ttbar sample



Conclusions

- Out of the box tests of b-tagging algorithms performed
- Benchmark: Wt signal (Rome processing)
- Generally good agreement with previous studies
- Preliminary indication: lhSig best tagger choice for Wt
- Might want to switch to 0.4 cone jets
- Last but not least: background studies are needed
 - kinematical characterization of signal
 - crucial for b-tagging fake rates



Next: DC3 Samples

■ Signal

- $Wt, W \rightarrow l\nu_l$ (sample 5500), TopRex/AcerMC
 - overall analysis signal efficiency $\sim 1\%$
 - 10k could be statistically limited...

■ Backgrounds

- Wbb (sample 5280), AcerMC/Pythia
- $W+(4)jets$ (samples 5222÷5225), Alpgen/Herwig
 - jet p_T threshold (40GeV/c) too high
 - most likely cannot rely on Pythia PS generation
- ttbar